

REMARKS

Claims 1-20 are pending in this application. By this Amendment, claims 1, 8, 11, 13-15 and 19 are amended. Support for the amendment to claims 1, 8, 15 and 19 can be found in the specification as originally filed, for example, at page 10, line 8-25. Support for the amendments to claims 11, 13 and 14 can be found in claims 10, 11, 13 and 14 as originally filed. Thus, no new matter is added.

I. Claim Objections

The Office Action objects to claim 11-14 as being in improper form. Applicants respectfully submit that the amendments to claims 11, 13 and 14 place claims 11-14 into proper form. Accordingly, Applicants respectfully request that claims 11-14 be examined on the merits with claims 1-10 and 15-20.

Further, Applicants respectfully submit that the pending multiple dependent claims contain proper language for multiple dependent claims under MPEP §608.01(n).

II. Restriction Requirement

The Office Action asserts that the election of claims 15-18 with traverse is improper. Applicants respectfully submit that all of the pending claims should be considered together. A provisional election of claims 15-18 was made, in the interest of furthering prosecution, in response to an apparent restriction requirement in the February 24, 2004 Office Action, which Applicants submit was both unclear and improper. Accordingly, Applicants respectfully withdraw the provisional election of claims 15-18.

III. Election of Species Requirement

The Office Action maintains the Election of Species Requirements, asserting that search and examination of all disclosed and claimed species would be a serious burden. The Office Action also asserts that Applicants have failed to provide evidence that a search of all

species has been conducted by Applicants and such evidence has been submitted to the Office.

Applicants respectfully submit that the burden is on the Office to conduct a thorough search of the subject matter of the claims. See MPEP §904. Applicants are not required to conduct a search of all disclosed species and disclose the results of such a search to the Patent Office; rather, "[e]ach individual associated with the filing and prosecution of a patent application has a duty of candor and good faith in dealing with the Office, which includes a duty to disclose to the Office all information known to that individual to be material to patentability." See 37 C.F.R. §1.56(a). Applicants respectfully submit that Applicants' duty of disclosure does not extend to conducting a search, as suggested by the Office Action.

A proper election of species was made to LiBF_4 as the disclosed salt species; linear EO-type phosphazene derivatives of formula (1) in which X is the organic group (A) of formula (3), Y^1 to Y^3 and Y^5 to Y^6 are all single bonds, R^1 to R^3 and R^5 to R^6 are all ethoxy groups, and Z is oxygen as the disclosed phosphazene derivative; and γ -butyrolactone as the disclosed aprotic organic solvent. Applicants understand, however, that upon search, examination and allowance of the elected species, search and examination will continue as to the non-elected species within the scope of generic claims 1-20.

IV. Claim Rejections

A. International Preliminary Examination Report

The Office Action rejects claims 1-20 under 35 U.S.C. §102 over Japanese Patent Application Publication JP 11-144757 (hereafter, "JP-757"), over Japanese Patent Application Publication JSP 06-013108 (hereafter, "JP-108") and over Japanese Patent Application Publication JP 11-191431 (hereafter, "JP-431"). The Office Action further provisionally rejects claims 1-10 and 15-20 under 35 U.S.C. §103(a) over JP-757, over JP-

108, over JP-431, and over JP-431, JP-757 and JP-108. Applicants respectfully traverse this rejection.

Claim 1 sets forth, in pertinent part, a “non-aqueous electrolyte cell comprising a non-aqueous electrolyte that contains lithium ions and more than 2.5 % by volume of a phosphazene derivative having a flash point of not lower than 100°C, and a positive electrode, and a negative electrode capable of absorbing and releasing lithium; wherein the phosphazene derivative is a liquid at room temperature.” Claims 2-7 depend from claim 1. Claim 8 sets forth a “non-aqueous electrolyte secondary cell comprising a non-aqueous electrolyte that contains a supporting salt, an organic solvent and a phosphazene derivative, and a positive electrode, and a negative electrode; wherein the phosphazene derivative is a liquid at room temperature; wherein the potential window of the phosphazene derivative is such that its lowermost limit is at most +0.5 V and its uppermost limit is at least +4.5 V, and the potential window of the organic solvent is wider than that of the phosphazene derivative.” Claims 9-14 depend from claim 8. Claim 15 sets forth a “non-aqueous electrolyte secondary cell comprising a non-aqueous electrolyte that contains a supporting salt and a phosphazene derivative of which the electroconductivity in a lithium salt solution (0.5 mol/liter) is at least 2.0 mS/cm, and a positive electrode, and a negative electrode; wherein the phosphazene derivative is a liquid at room temperature.” Claims 16-18 depend from claim 15. Claim 19 sets forth a “non-aqueous electrolyte secondary cell comprising a non-aqueous electrolyte that contains a supporting salt and a phosphazene derivative whose dielectric constant at 25°C is at least 15 and the viscosity is at most 20 mPa·s (20 cP), and a positive electrode, and a negative electrode; and wherein the phosphazene derivative is a liquid at room temperature.” Claim 20 depends from claim 19.

The Office Action asserts that claims 1-20 are not patentable over each of JP-757 and JP-108 and that claims 1-9 and 11-20 are not patentable over JP-431, based on the

International Preliminary Examination Report in PCT/JP00/05053. Applicants respectfully disagree.

In the art relating to batteries, lowering the viscosity of an electrolyte solution is generally not preferred for reasons of safety. In particular, when the viscosity of the electrolyte solution is lowered, the battery will have increased internal pressure and flammability. The conventional lithium ion batteries disclosed in the cited references sacrifice safety for higher output by lowering the viscosity of the electrolyte solution by increasing the mixing ratios of low-viscosity solvents, such as ethylmethyl carbonate and diethyl carbonate.

In contrast, the cells of claims 1, 8, 15 and 19 have a low viscosity electrolyte solution by including a phosphazene derivative. This allows the cells of claims 1, 8, 15 and 19 to provide a battery cell that does not suffer from increased internal pressure or flammability, and thus a safer cell.

None of the cited references disclose or suggest including a phosphazene derivative in the cell. Further, the cited references do not disclose or suggest any method of assuring the safety of a battery while providing an electrolyte solution having a low viscosity.

B. Nakacho and Daifuku

The Office Action rejects claims 15, 1-10 and 16-20 under 35 U.S.C. §103(a) over U.S. Patent 5,114,809 to Nakacho et al. and U.S. Patent 5,108,855 to Daifuku et al. Applicants respectfully traverse this rejection.

Independent claims 1, 8, 15 and 19 are as set forth above. Claims 2-7, 9-14, 16, 17 and 20 depend, directly or indirectly, from claims 1, 8, 15 and 19, respectively.

Nakacho is cited as disclosing the use of a secondary battery having a non-aqueous electrolyte solution containing a phosphazene derivative. Daifuku is cited for its additional teachings, including the use of γ -butyrolactone as the aprotic organic solvent.

However, neither Nakacho nor Daifuku disclose or suggest a phosphazene derivative that is a liquid at room temperature. Instead, both Nakacho and Daifuku, as well as Ogino (which is cited as a secondary reference without being incorporated into any specific claim rejection), specifically disclose solid phosphazene derivatives. *See* Nakacho, Abstract, col. 3, lines 49-52; Daifuku, col. 9, lines 27-33; Ogino, col. 6, lines 9-14.

As discussed in the specification, solid phosphazenes are known and have good flame retardation properties. *See* Specification, page 10, lines 8-12. However, solid phosphazene electrolytes cannot attain good cycle characteristics and are limited in their application to low-discharge current cells. *See* Specification, page 10, lines 15-17. Compared to liquid electrolyte-containing cells, cells incorporating solid phosphazene electrolytes have ionic conductivities that are between 1/10000 and 1/1000 of the cells incorporating liquid electrolytes. *See* Specification, page 10, lines 12-15.

In contrast, phosphazene electrolytes that are liquid at room temperature, such as those required by claim 1, possess good electroconductivity and cycle characteristics. *See* Specification, page 10, lines 18-23. The electroconductivity and cycle characteristics of cells employing liquid phosphazene electrolytes are comparable to ordinary cells containing ordinary liquid electrolytes. *See* Specification, page 10, lines 23-25.

Thus, Nakacho and Daifuku, individually or in combination, do not disclose or suggest a phosphazene derivative is a liquid at room temperature, as set forth in claim 1; nor do these references disclose or suggest the improved electroconductivity and cycle characteristics that can be obtained by the use of liquid phosphazene electrolytes, as compared to solid phosphazene electrolytes.

Applicants respectfully submit that claims 1-20 are patentable over Nakacho and Daifuku, individually or in combination. Accordingly, reconsideration and withdrawal of this rejection are respectfully requested.

V. Conclusion

In view of the foregoing, it is respectfully submitted that this application is in condition for allowance. Favorable reconsideration and prompt allowance of claims 1-20 are earnestly solicited.

Should the Examiner believe that anything further would be desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact the undersigned at the telephone number set forth below.

Respectfully submitted,



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Attachments:

Information Disclosure Statement
PTO-1449
3 Japanese References

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